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Building & Highway Material Testing Laboratory

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Job No.: CTCE/BBMP/W.No.05/BBU/WMM/Gradation/2016-17 : 19.09.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.

Agency : **Mr. B. B. Umesh,**
#385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.

Name of Work : Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016

Date of Testing : 19.09.2016

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	105	105	2.1	97.9	95-100
22.4	1695	1800	36.0	64.0	60-80
11.2	685	2485	49.7	50.3	40-60
4.75	600	3085	61.7	38.3	25-40
2.36	450	3535	70.7	29.3	15-30
0.600	685	4220	84.4	15.6	8-22
0.075	650	4870	97.4	2.6	0-8

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Job No.: CTCE/BBMP/W.No.05/BBU/WMM/AIV/2016-17 19.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the Work	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	19.09.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	81	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	301	
4	Aggregate Impact value = percent fines	21.05	21.20	
	$100^* (W_2/W_1)\%$			**21.33**

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.05/BBU/WMM/S-T/2016-17 19.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of Work	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	19.09.2016

Result : Flakiness Index = **12.19%**

Elongation Index = **13.28%**

Result : Combined Flakiness & Elongation index **25.47%**

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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T-2377

Job No.: CTCE/BBMP/W.No.05/BBU/CSR-09/148e/QB(BC)/2016-17 22.09.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

***CUSTOMER**	:	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
***AGENCY**	:	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
***NAME OF THE WORK**	:	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
REFERENCE	:	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
***SAMPLE ID**	:	Bitumen
DATE OF SAMPLING	:	20.09.2016
DATE OF TESTING	:	22.09.2016

The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	82	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	46	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	298	Min. 220

*Information is furnished by the Customer/Representative.

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Job No.: CTCE/BBMP/W.No.05/BBU//BC/AIV/2016-17 22.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the Work	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	22.09.2016

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	386	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	301	
4	Aggregate Impact value = percent fines			
	100* (W_2/W_1) percent	21.82	22.02	**21.92**

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Job No.: CTCE/BBMP/W.No.05/BBU/BC/Shape.T/2016-17 : 22.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	: **Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of Work	: Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	: BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Bituminous Concrete
Date of Testing	: 22.09.2016

Result : Flakiness Index = **11.02%**

Elongation Index = **13.80%**

Result : Combined Flakiness & Elongation index **24.82%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.05/BBU/BC/Stripping/2016-17

23.09.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the Work	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Type of Mix	Bituminous Concrete
Date of Testing	23.09.2016

Type of binder : 80/100

Percentage of binder used : 5.00% by wt.

Total weight of aggregate : 200 g

Total weight of binder : 10.00 g

Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.2	3.30	96.70
2	3.3		
3	3.4		

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.05/BBU/BC/Sp_Wa/2016-17 23.09.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the Work	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Type of Mix	Bituminous Concrete
Date of Testing	23.09.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	1998	1999	2000	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1239	1238	1245	
4	Weight of saturated surface dry aggregate in air	W_3 g	2023	2024	2025	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	784	786	780	
6	Weight of oven dried aggregate	W_4 g	2010	2011	2012	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.564	2.559	2.579	2.567
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.607	2.602	2.623	2.611
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.65%	0.65%	0.65%	0.65%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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Job No: CTCE/BBMP/W.No.05/BBU/BC/Bitumen/2016-17

23.09.2016

BITUMEN CONTENT DETERMINATION OF BITUMINOUS CONCRETE MIX

As per IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
NAME OF THE WORK	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
SAMPLE I/D	Pot holes filling to roads in ward No.05
DATE OF TESTING	23.09.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474	473
3. Weight of Asphalt and Mineral matter Extracted, g	-	
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	26	27.00
7. Bitumen content in %	5.20	5.40
8. Average	**5.30**	

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Job No: CTCE/BBMP/W.No.05/BBU/BC/Bitumen/2016-17 23.09.2016

BITUMEN CONTENT AFTER GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

As Per IS 2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
NAME OF THE WORK	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
SAMPLE I/D	Pot holes filling to roads in ward No.05
DATE OF TESTING	23.09.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	45.26	9.55	9.55	90.45	79-100
9.5	35.25	7.44	16.99	83.01	70-88
4.75	66.35	14.00	30.98	69.02	53-71
2.36	65.38	13.79	44.78	55.22	42-58
1.18	54.36	11.47	56.24	43.76	34-48
0.6	62.35	13.15	69.40	30.60	26-38
0.3	38.55	8.13	77.53	22.47	18-28
0.15	39.32	8.30	85.83	14.17	12-20
0.075	39.2	8.27	94.10	5.90	4-10

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	35.26	7.45	7.45	92.55	79-100
9.5	42.25	8.93	16.39	83.61	70-88
4.75	76.36	16.14	32.53	67.47	53-71
2.36	63.32	13.39	45.92	54.08	42-58
1.18	71.22	15.06	60.97	39.03	34-48
0.6	46.35	9.80	70.77	29.23	26-38
0.3	40.25	8.51	79.28	20.72	18-28
0.15	33.65	7.11	86.40	13.60	12-20
0.075	33.32	7.04	93.44	6.56	4-10

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Job No.: CTCE/BBMP/W.No.05/BBU/BC/Agg/2016-17 23.09.2016

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of theWork	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	23.09.2016

Total Weight of Sample: **5150** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	625	12.14	12.14	87.86	79 - 100	
9.5	460	8.93	21.07	78.93	70 - 88	
4.75	580	11.26	32.33	67.67	53 - 71	
2.36	600	11.65	43.98	56.02	42 - 58	
1.18	625	12.14	56.12	43.88	34 - 48	
0.600	530	10.29	66.41	33.59	26 - 38	
0.300	595	11.55	77.96	22.04	18 - 28	
0.150	435	8.45	86.41	13.59	12 - 20	
0.075	400	7.77	94.17	5.83	4 - 10	

Total Weight of Sample: **5250** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	635	12.10	12.10	87.90	79 - 100	
9.5	455	8.67	20.76	79.24	70 - 88	
4.75	590	11.24	32.00	68.00	53 - 71	
2.36	615	11.71	43.71	56.29	42 - 58	
1.18	635	12.10	55.81	44.19	34 - 48	
0.600	550	10.48	66.29	33.71	26 - 38	
0.300	590	11.24	77.52	22.48	18 - 28	
0.150	480	9.14	86.67	13.33	12 - 20	
0.075	420	8.00	94.67	5.33	4 - 10	

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Basaveshwaranagar, Bangalore-560 079.

Job No.: CTCE/BBMP/W.No.05/BBU/BC/Stability/2016-17 23.09.2016

TEST REPORT ON STABILITY OF MIX

Customer	:	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	:	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of Work	:	Pot Hole filling and Road patch work in Kogilu, Kogilu Layout, Agrahara, Agrahara Layout, Kattigenahalli Palanahalli, Vinayakanagara, Dwarakanagara and other areas in Ward No.05, Byatarayanapura Sub Division, BBMP, Bangalore.
Reference	:	BBMP/EE/BTP/WO/116/2016-17 Dated: 25.08.2016
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	23.09.2016

The results of the tests conducted on the bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.05	9.10	9 Kn (min)
2	Marshal flow, mm	2.90	3.05	2 – 4
3	Percent air voids in Mineral Aggregate	3.65	4.10	3 – 6
4	Voids in Compacted Mix	13.05	13.40	13 – 15
5	Percent Voids filled with Bitumen	66.25	67.20	65 - 75
6	Density, g/cc	2.27	2.28	--

Note:

⇒ This test report shall not be reproduced except in full, without written approval of the laboratory.

⇒ The results indicated above are based on the tests carried out on the samples received in the laboratory.

⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

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